

an oscillator circuit for generating carrier waves to transmit the FM signals received from the stereo modulation circuit;

a program counter for frequency dividing the carrier waves into variable frequency components; and

a PLL frequency synthesizer which has a phase comparator circuit for comparing the variable frequency components output from the program counter with another output of the reference frequency divider to provide at an output end of the PLL frequency synthesizer a control signal for controlling the oscillator circuit.

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cont - In this arrangement, since the FM transmitter may generate various frequency signals for both the stereo modulation and frequency comparison in the PLL frequency synthesizer by means of a single oscillator, the resulting FM transmitter has most of the elements integrated in one chip, which implies that the transmitter has far smaller dimensions and a simpler structure in number and arrangement of elements than conventional transmitters, and hence offers increased reliability and reduced manufacturing cost. Further, the program counter may be constructed such that the frequency division ratios of the program counter and the modulation level of the stereo modulator circuit are controllable by external means. It is then possible to vary the carrier frequency of the FM transmission wave as needed and to set the FM modulation at a characteristically optimum level.

The frequency of the reference frequency generator may be chosen to be 7.6 MHz or an integral multiple or fractional frequencies of 7.6 MHz obtained by dividing 7.6 MHz by integers (hereinafter referred to as integer fractions). It should be noted that this choice of the fundamental frequency allows provision of not only commonly used 38 kHz and 19 kHz stereo modulation frequencies through the frequency divisions but also FM radio frequencies which are close to conventional frequencies by the same quartz oscillator.

In accordance with another aspect of the invention, a frequency modulating (FM) transmitter includes:

a reference frequency generator for generating a reference frequency;
a reference frequency divider for frequency dividing the reference frequency;
a stereo modulation circuit for frequency modulating audio signals by using one output of the reference frequency divider to supply resultant stereo modulated signals as FM signals;

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Cont an oscillator circuit for generating carrier waves to transmit the FM signals;
a program counter for frequency dividing the carrier waves into variable frequency components; and

a PLL frequency synthesizer which has a phase comparator circuit for comparing the variable frequency components output from the program counter with another output of the reference frequency divider.

In accordance with another aspect of the invention, a method of generating an FM signal includes:

generating a reference frequency;
dividing the reference frequency using a reference frequency divider;
frequency modulating a right audio signal and a left audio signal using one output of the reference frequency divider to supply FM signals;

generating carrier waves to transmit the FM signals using an oscillator circuit;

dividing the carrier waves into variable frequency components; and
comparing the variable frequency components with another output of the reference frequency divider using a phase comparator circuit in a PLL frequency synthesizer."

Please replace the paragraph on page 10, lines 3-9, with the following text: